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DOI: https://doi.org/10.1177/1073191121998760

Article

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Assessment
1–15

DOI: 10.1177/1073191121998760
journals.sagepub.com/home/asm


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Abstract

Researchers around the world are applying the recently revised Portrait Value Questionnaire (PVQ-RR) to measure the 19 values in Schwartz's refined values theory. We assessed the internal reliability, circular structure, measurement model, and measurement invariance of values measured by this questionnaire across 49 cultural groups (N = 53,472) and 32 language versions. The PVQ-RR reliably measured 15 of the 19 values in the vast majority of groups and two others in most groups. The fit of the theory-based measurement models supported the differentiation of almost all values in every cultural group. Almost all values were measured invariantly across groups at the configural and metric level. A multidimensional scaling analysis revealed that the PVQ-RR perfectly reproduced the theorized order of the 19 values around the circle across groups. The current study established the PVQ-RR as a sound instrument to measure and to compare the hierarchies and correlates of values across cultures.

Keywords

Portrait Values Questionnaire–revised, PVQ-RR, values, measurement models, measurement invariance, multidimensional scaling, value circle

Schwartz (2017; Schwartz et al., 2012) recently presented a refined theory of values that elaborates on his earlier theory of 10 basic personal values (Schwartz, 1992). The refined theory specifies 19 more narrowly defined values, arrayed on the same circular continuum. To measure these values, he developed a revised Portrait Value Questionnaire (PVQ-RR). Researchers around the world are currently applying the PVQ-RR. However, its basic psychometric properties have yet to be published. We fill this gap in the literature by presenting results obtained with 32 language versions of the PVQ-RR from 49 cultural groups (N = 53,472).[1] The purpose of the present report is to assess the reliability, circular structure, measurement model, and measurement invariance of values measured by the PVQ-RR across cultural groups from all inhabited continents. We also provide the median and interquartile range of the means for each of the 19 centered values to give a sense of their relative importance hierarchies across cultural groups.

Values refer to what people find important, good and worthy in life (Sagiv et al., 2017). Values have been a central concept in the social sciences for over a century (Durkheim, 1893; Parsons, 1951; Rokeach, 1973; Weber, 1905). More recently, researchers have studied relations of values to behavior (e.g., Roccas & Sagiv, 2017), attitudes (e.g., Boer & Fischer, 2013), personality (e.g., Parks-Leduc et al., 2015), well-being (e.g., Schwartz & Sortheix, 2018) and various clinically relevant concepts (e.g., Huczewska, Rogoza, 2020). The model of values used in the above studies, is the one proposed by Schwartz (1992, Schwartz et al., 2012) that is currently predominant in the literature.

The Schwartz Model of Values

Schwartz (1994) defined values as "transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity" (p. 21). He elaborated on this definition by specifying seven characteristics of values explicitly or implicitly found in most psychological models of values (Schwartz, 2016):

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1. Values are beliefs about the importance of desirable goals.
2. When activated, values elicit emotion.
3. Values are basic goals that apply across specific situations.
4. Values consciously or unconsciously motivate behavior, perception, and attitudes.
5. Value effects occur through a process of trade-offs among the relevant values.
6. Values serve as standards for evaluating actions, people, and events.
7. Values are ordered by importance in a relatively enduring hierarchical system.

The above characteristics apply to *all* values. They indicate nothing, however, about what distinguishes one value from another. What distinguishes among values is their distinct motivational content. The motivational content of a value refers to the direction toward which the value aims perceptions and decisions of people who find it important. People differ in what they find important in life. Various value models propose catalogs of the motivational contents of values that can be used to describe people's value preferences. For example, Allport and Vernon (1931) proposed six types of values and Rokeach (1973) proposed a list of 18 terminal and 18 instrumental values. These and other catalogs are more or less arbitrary attempts to delineate the contents of the value domain. The critical innovation of the Schwartz approach was to identify basic rules that underlie the structure of relations among the motivational contents of values rather than to propose yet another catalog.

Schwartz (1992) theorized that all values form a circular motivational continuum. The concept of a circular continuum of values expresses the idea that the motivations that values express blend into one another just as the colors in the color circle do. One can divide the circular continuum into wedges in many ways depending on the research goal and the desired precision of measurement. As depicted in Figure 1, researchers have divided the circle into as few as two broadly defined values or as many as 19 more narrowly defined values. The circle captures three critical features of relations among values: (a) Adjacent values in the circle are motivationally compatible and can be pursued in the same action (e.g., hedonism and stimulation); (b) Values located on opposing sides of the circle are motivationally opposed and typically cannot be pursued in the same action (e.g., stimulation vs. security); and (c) The motivational compatibility between values decreases with the distance between them around the circle.

The relations among values can be described on various sets of two dimensions (coordinate systems). The most common sets of basic dimensions, also referred to as main principles that organize the value circle (Schwartz, 2016), include the following: (a) openness to change versus conservation values and self-enhancement versus self-transcendence values, (b) personal focus versus social focus values, and (c) growth versus self-protection values. Figure 1 presents the most common divisions of the circle and main principles organizing the value circle. Although the circle in Figure 1 locates the values as equidistant, the theory refers only to their order. Table 1 presents definitions of the 4, 10, and 19 values as they are most often used in the literature.

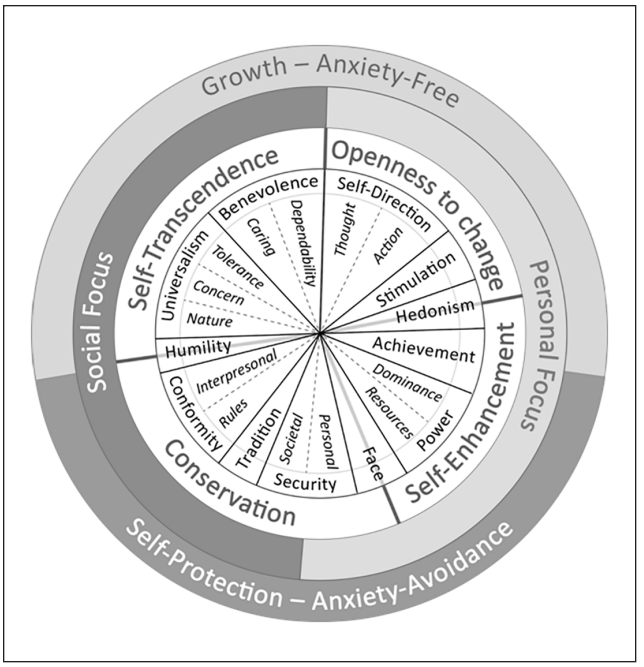

Figure 1. Circular motivational continuum of 19 values in the refined value theory (Schwartz, 2016).

The first instrument Schwartz developed to measure values, the Schwartz Value Survey, was intended to assess whether people actually differentiate the 10 values in his original theory (Schwartz, 1992). Building on the work of Rokeach (1973), this instrument asked respondents to rate the importance of each of 57 abstract values as a guiding principle in their life. Although this instrument demonstrated that respondents in 20 cultural groups did, indeed, differentiate among the 10 values (Schwartz & Boehnke, 2004), the abstract method of measurement did not work as well with adolescent respondents and those with less education. To overcome this problem and to address criticism against such a direct and abstract measure (Schwartz & Cieciuch, 2016), Schwartz developed the PVQ (Schwartz et al., 2001).

There are several versions of the PVQ, differing in the number of items they include and the number of values they were designed to measure. All of the versions measure values indirectly by asking respondents how similar they themselves are to different people who are described in

Table 1. The Four Higher Order Values, 10 Basic Values, and 19 More Narrowly Defined Values in the Refined Theory of Values.

Four higher order values	10 Original values	19 More narrowly defined values
Self-transcendence	Benevolence: Preservation and enhancement of the welfare of people with whom one is in frequent personal contact	Benevolence-Dependability (BED): Being a reliable and trustworthy member of the in-group
		Benevolence-Caring (BEC): Devotion to the welfare of in-group members
	Universalism: Understanding, appreciation, tolerance, and protection for the welfare of *all* people and of nature	Universalism-Tolerance (UNT): Acceptance and understanding of those who are different from oneself
		Universalism-Concern (UNC): Commitment to equality, justice, and protection for all people
		Universalism-Nature (UNN): Preservation of the natural environment
		Humility[a] (HUM): Recognizing one's insignificance in the larger scheme of things
Conservation	Conformity: The restraint of actions, inclinations, and impulses that are likely to upset or harm others and violate social expectations or norms	Conformity-Interpersonal (COI): Avoidance of upsetting or harming other people
		Conformity-Rules (COR): Compliance with rules, laws, and formal obligations)
	Tradition: Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provides	Tradition (TR): Maintaining and preserving cultural, family, or religious traditions
	Security: Safety, harmony, and stability of society, relationships, and self	Security-Societal (SES): Safety and stability in the wider society
		Security-Personal (SEP): Safety in one's immediate environment
		Face[a] (FAC): Security and power through maintaining one's public image and avoiding humiliation
Self-enhancement	Power: Control or dominance over people and resources	Power-Resources (POR): Power through control of material and social resources
		Power-Dominance (POD): Power through exercising control over people
	Achievement: Personal success through demonstrating competence according to social standards	Achievement (AC): Definition unchanged
	Hedonism: Pleasure and sensuous gratification for oneself	Hedonism[a] (HE): Definition unchanged
Openness to change	Stimulation: Excitement, novelty, and challenge in life	Stimulation (ST): Definition unchanged
	Self-Direction: Independent thought and action, choosing, creating, and exploring	Self-Direction-Action (SDA): The freedom to determine one's own actions
		Self-Direction-Thought (SDT): The freedom to cultivate one's own ideas and abilities

Source. Adapted from Schwartz (1992, 2017), and Schwartz et al. (2012).
[a]Humility is located between the higher order conservation and self-transcendence values. Hedonism is located between the higher order openness to change and self-enhancement values. Face is located between the higher order self-enhancement and conservation values.

terms of what is important to them. We describe this measurement approach in detail in the methods section below. The 40 item PVQ-40 (Schwartz, 2003) successfully measures the 10 basic values (e.g., Cieciuch & Schwartz, 2012). The PVQ-21, used in European Social Survey, succeeds in differentiating only 7 of the 10 values, requiring that some pairs of values be unified (Davidov et al., 2008).

When Schwartz proposed his refined value theory that distinguishes 19 values in the value circle, he designed a 57-item PVQ. This PVQ has undergone several revisions (the PVQ-5X, Schwartz et al., 2012; the PVQ-R, Schwartz et al., 2017; Tamir et al., 2016; the PVQ-RR, Schwartz, 2017). This current study presents the psychometric properties of the PVQ-RR in a large set of cultural groups for the first time. Several sources describe how the finer distinctions of the 19 values provide new insights into the relations of values to attitudes, behaviors, personality, and demographics (Hanel et al., 2018; Schwartz, 2017; Schwartz et al., 2012; Schwartz et al., 2017).

The Current Study

The PVQ-RR is the final PVQ questionnaire designed to measure values differentiated in the refined model of

Schwartz's values (Schwartz et al., 2012). The goal of the current study is to assess the reliability, circular structure, measurement model, and measurement invariance of values measured by the PVQ-RR across a large set of cultural groups from all inhabited continents. In so doing, it also provides a rigorous test of the refined model of 19 values and its applicability across cultures. We formulated the following expectations:

1. The internal reliability of the four higher order values is satisfactory in all cultural groups. The internal reliability of most of the 19 more narrowly defined values is satisfactory in most cultural groups.
2. The 19 values are differentiated in the measurement models in each cultural group.
3. Most of the 19 values exhibit configural and metric measurement invariance across the cultural groups.
4. The 19 values fit the theorized circular structure presented in Figure 1 in most cultural groups.

Method

Samples and Procedure

Data were collected between 2017 and 2020 in 49 cultural groups. Table 2 provides the basic characteristics of the 49 samples. Researchers in each country recruited their own sample as part of their own research. When they had requested and obtained the PVQ-RR from the first author, they agreed to give him a copy of the values data they obtained. The various researchers chose whether to use paper-and-pencil or online methods or both and whether to gather data individually or in groups. This variety along with the differences among groups in culture, language, and distributions of age and gender yielded a set of highly diverse samples. By lowering the probability of finding invariance of value structures across groups, this diversity increased the stringency of the evaluation of the PVQ-RR.

Measurement Instrument. The PVQ-RR includes 57 items. Three items measure each of the 19 values. Each item consists of one sentence that describes a different person in terms of the goals, aspirations or wishes he or she considers important in life (Schwartz et al., 2001). Respondents compare the person described to themselves and rate how similar the person is to them on a 6-point labeled scale: 1 (*not like me at all*), 2 (*not like me*), 3 (*a little like me*), 4 (*moderately like me*), 5 (*like me*), and 6 (*very much like me*). The response scale is asymmetric, with two dissimilarity and four similarity options, because people tend to think that attributing importance to values is socially desirable. The response scale asymmetry captures this psychological asymmetry and permits finer discrimination on the scale where it is needed (Schwartz & Cieciuch, 2016).

The PVQ method measures values indirectly, without mentioning the word *values*. This indirect method fits the assumption that people may not have articulated values. The method is quite easy for respondents because social comparison is natural and frequent in everyday life. Note that respondents are asked to compare the person described to themselves, not themselves to the other. Comparing the other with self directs attention to the available, narrow information about the other's valued goals. Hence the similarity judgment is likely to focus on the value-relevant aspects of the other. Comparing the self with others might direct attention to salient aspects of one's self-image, so the similarity judgment might focus on value-irrelevant characteristics (Schwartz et al., 2001). Respondents received a version of the PVQ that is matched to their own gender.

Table S1 in the online supplement presents the male English version of the 57 items. Versions of the PVQ-RR in 47 languages (male and female versions in languages that distinguish pronouns), scoring instructions, and recommendations regarding the statistical procedures that do or do not require centering of values within-person are stored at the Open Science Framework available at https://osf.io/w9as3/?view_only=e1f02bf232c34d39b9884398b4f2df63. All translations were done by native speakers who obtained back-translations into English. The author of the PVQ-RR then evaluated and commented on the translations and back-translations and returned them to the native speaker. Iterations of this procedure continued until the author was satisfied and authorized the translation. Supplement S13 (available online) presents the instructions provided to translators.

Reliability. We use Cronbach's alpha to report the internal reliability of the 10 basic, 19 narrowly defined, and four higher order values in each country. Although there is criticism of Cronbach's alpha (Sijtsma, 2009), it is still widely used. We therefore present it for heuristic purposes. This information enables readers to identify the values with higher and lower coefficients in the countries that interest them. To simplify presenting the general picture, we use the threshold of >0.70 for higher order values and > 0.60 for the 19 narrowly defined values that are each measured with only three items (Kline, 1999).

Differentiation of the 19 Values. We used confirmatory factor analysis (CFA) in each cultural group to assess whether the 19 values were differentiated. Because the values form a circular structure, one can expect cross-loadings between opposing values in the circle. Such cross-loadings are irrelevant for assessing whether neighboring values can be differentiated from one another. We therefore followed the common procedure for handling this in value research: We tested a separate model for each higher order value (conservation, self-transcendence, openness to change and

Table 2. Description of the 49 Samples in the Study.

Cultural group	*N*	Language	Female (%)	Age, *M* (*SD*)
Australia	1,484	English	49.5	40.9 (12.7)
Brazil	744	Portuguese	59.9	33.0 (11.1)
Canada English	480	English	72.5	19.8 (4.3)
Canada French	602	French	67.3	23.5 (4.5)
China	1,201	Chinese	51.2	24.2 (6.0)
Colombia	410	Spanish	55.9	21.8 (2.9)
Costa Rica	601	Spanish	53.1	19.0 (2.4)
Croatia	457	Croatian	65.6	28.4 (11.5)
Czech Republic	806	Czech	68.4	27.2 (9.4)
Ecuador	514	Spanish	49.6	41.5 (10.8)
Estonia	227	Estonian	59.9	26.0 (7.7)
Faroe Islands	365	Faroese	60.0	38.3 (14.3)
Finland	723	Finnish	64.7	25.6 (5.4)
France	834	French	65.2	27.0 (10.1)
Georgia	316	Georgian	71.2	19.4 (1.1)
Germany	1,740	German	66.6	34.8 (17.1)
Ghana	400	English	50.5	22.9 (1.5)
Greece	1,919	Greek	56.1	30.1 (13.3)
Hong Kong	1,691	Chinese	63.0	23.0 (5.8)
Iceland	1,229	Icelandic	77.5	30.4 (15.1)
India	963	Hindi	41.6	26.6 (6.7)
Indonesia	543	Bahasa Indonesia	58.0	21.3 (2.5)
Israel Arab	420	Arabic	57.9	22.0 (2.8)
Israel Jewish	2,137	Hebrew	53.2	39.2 (17.3)
Italy	624	Italian	61.4	23.6 (5.1)
Japan	687	Japanese	43.4	22.8 (8.2)
New Zealand	664	English	61.9	25.2 (11.5)
Oman	240	Arabic	60.8	32.3 (11.7)
Peru	317	Spanish	57.7	21.2 (2.5)
Philippines	522	Filipino	69.3	32.1 (8.1)
Poland	4,448	Polish	62.6	33.4 (15.1)
Portugal	801	Portuguese	81.1	37.6 (15.6)
Romania	226	Romanian	57.1	23.7 (7.1)
Russia Caucasus	1291	Russian	63.4	32.4 (13.1)
Russia Central	1789	Russian	58.0	31.5 (12.9)
Russia Siberia	232	Russian	74.6	25.2 (8.1)
Serbia	868	Serbian	61.9	27.8 (7.6)
Slovakia	249	Slovak	56.2	23.6 (4.6)
South Africa	490	English	62.2	45.6 (13.1)
South Korea	271	Korean	65.7	21.1 (3.1)
Spain	3,108	Spanish	63.0	39.3 (14.4)
Sweden	327	Swedish	70.3	25.0 (5.0)
Switzerland French	1,522	French	56.8	44.1 (14.3)
Switzerland German	4,325	German	59.6	41.7 (16.0)
Turkey	343	Turkish	68.8	21.8 (2.3)
Ukraine	228	Ukrainian	59.2	24.9 (7.3)
The United Kingdom	1,478	English	54.9	45.4 (18.1)
The United States	6,867	English	46.4	43.8 (19.3)
Vietnam	749	Vietnamese	65.6	20.3 (1.3)
Total	53,472		59.0	34.2 (15.8)

self-enhancement; see, e.g., Cieciuch, Davidov, Algesheimer, et al., 2018; Cieciuch & Schwartz, 2012; Schwartz et al., 2012; Schwartz et al., 2017). We expected to obtain acceptable model fit indices in most cultural groups. To evaluate model fit, we used the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). We treated CFI $\geq$ .90. RMSEA $\leq$ .08, and SRMR $\leq$ .06 as indicating a reasonable model fit (Hu & Bentler, 1999; Marsh et al., 2004).[2]

Measurement Invariance. We assessed measurement invariance with multigroup CFA (MGCFA). We expected both configural and metric measurement invariance in most groups. Configural invariance means that in every group the same items load on the same values. Metric invariance supports the claim that the meaning of values is the same in each cultural group. Therefore, one can meaningfully compare correlates of values across groups. We did not expect to establish scalar invariance because scalar invariance is quite demanding and rarely established, especially with such a complex model and so many groups (Cieciuch et al., 2016). In the absence of scalar measurement invariance, the cross-cultural comparison of means can be biased but establishing metric measurement invariance allows for comparing the hierarchies and correlates of values across cultures. To evaluate measurement invariance, we applied cutoffs proposed by Chen (2007) to the results of the MGCFA: The cutoffs for configural invariance are the same as for single CFA models. Metric invariance is supported if, compared with the configural invariance model, CFI changes $\leq$ .01 and RMSEA changes $\leq$ .015 or SRMR changes $\leq$ .03. Scalar invariance is supported if, compared with the metric invariance model, CFI changes $\leq$ 0.01 and RMSEA changes $\leq$ 0.015 or SRMR changes $\leq$ 0.01. We performed all CFA and MGCFA analyses with M*plus* 7.1 (Muthén & Muthén, 1998-2012), using the maximum likelihood estimator.

Fit of the 19 Values to the Circular Structure. We assessed the fit of the 19 values to the theorized circular structure in each cultural group with confirmatory multidimensional scaling (MDS; Borg et al., 2013). MDS is the commonly used method for comparing the observed value circle with the theorized circle (e.g., Bilsky et al., 2011; Schwartz, 1992; Schwartz et al., 2012). We computed the value structure in each cultural group, using the Torgerson initial configuration.[3] We computed an MDS projection based on equally weighting the data from all groups to serve as the target structure.[4] We then rotated the value structure in each cultural group to the target structure with Procrustes rotation (Commandeur, 1991). To assess the fit of the structure in each group to the target structure, we calculated congruence coefficients between the loadings of the value items on the group's rotated coordinates and the loadings of the target structure. We report Tucker's phi coefficient as the index of congruence or similarity. Conventional rules of thumb for judging similarity consider coefficients $>$0.95 or $>$0.90 congruent and coefficients $<$0.85 noncongruent (ten Berge, 1986; van de Vijver & Leung, 1997).

Results

Reliability

The 19 narrowly defined values had a mean Cronbach's alpha reliability coefficient of 0.70 (SD = 0.08). For 15 of these values, the coefficient exceeded 0.60 in at least 41 of the 49 groups. The internal reliability of four narrowly defined values was problematic: self-direction thought was above .60 in 35 groups (M = 0.65, SD = 0.08), achievement in 27 groups (M = 0.60, SD = 0.09), security-personal in 16 groups (M = 0.58, SD = 0.07), and humility in only 4 groups (M = 0.47, SD = 0.09). Table S2 in the online supplement lists Cronbach's alpha coefficients in each of the 49 cultural groups for the 19 narrowly defined values.

For all four higher order values, Cronbach's alpha coefficient of reliability was greater than 0.70 in every one of the 49 cultural groups (M = 0.84, SD = 0.03). For the 10 basic values, the mean internal reliability coefficient was 0.76 (SD = 0.02). The coefficients of nine of the 10 values exceeded 0.60 in at least 44 of the 49 groups. Only the coefficient of achievement values, as noted above, was below 0.60. Table S3 in the online supplement lists Cronbach's alpha coefficients in each group for the 10 basic values and four higher order values.

Measurement Models Within Groups: CFA

Three of the narrowly defined values are located on the border between two higher order values in the value circle—face, hedonism, and humility. Because we planned to run the measurement models using the higher order values, we needed to assign these three values to one higher order value. For this purpose, we correlated each of the three values with its two neighboring higher order values in each of the 49 cultural groups. We then assigned the value to the higher order value with which it correlated more highly in the majority of cultural groups: This led to assigning face to conservation, hedonism to openness to change, and humility to self-transcendence. Table S4 in the online supplement presents the relevant correlations in each group.

To evaluate the differentiation of the 19 values within each cultural group, we examined the fit coefficients of the CFA for each higher order set of adjacent values. Table 3 summarizes the findings. It indicates both the percentage and the number of cultural groups whose model met each of the three standards for acceptance. The measurement models for self-transcendence were acceptable according

Table 3. Percentages of Samples (and Number of Samples in Brackets) With Acceptable Model Fit for the Given Measurement Model.

Model	Evaluation based on		
	CFI >.90	RMSEA < .08	SRMR < .06
Self-transcendence (UNN UNC UNT BEC BED HUM)	98% (48)	100% (49)	100% (49)
Openness to change (SDA SDT ST HE)	89.8% (44)	88% (43)	89.8% (44)
Conservation (SEP SES COI COR TR FAC)	85.7% (42)	96% (47)	83.7% (41)
Self-enhancement (AC POD POR)	77.6% (38)	44.9% (22)	73.5% (36)
Self-enhancement (AC POD POR) with modifications in problematic groups	100% (49)	100% (49)	100% (49)

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; UNN = Universalism-Nature; UNC = Universalism-Concern; UNT = Universalism-Tolerance; BEC = Benevolence-Caring; BED = Benevolence-Dependability; HUM = Humility; SDA = Self-Direction-Action; SDT = Self-Direction-Thought; ST = Stimulation; HE = Hedonism; SEP = Security-Personal; SES = Security-Societal; COI = Conformity-Interpersonal; COR = Conformity-Rules; TR = Tradition; FAC = Face; AC = Achievement; POD = Power-Dominance; POR = Power-Resources.

to all three standards in all 49 groups, excepting the CFI standard in one group. The measurement models for openness to change and conservation exhibited acceptable fit in the vast. majority of groups (88% and 84%, respectively) on all fit standards. The measurement models for self-enhancement were problematic, especially with regard to the RMSEA standard. The model was acceptable in only 45% of groups on that standard. The measurement models and fit indexes for each cultural group are presented in online supplement Tables S5 (Self-transcendence), S6 (Openness to change), S7 (Conservation), and S8 (Self-enhancement).

To understand the problems with the self-enhancement model, we examined the modification indexes. In 22 cultural groups, all three fit indexes were acceptable. The modification indexes in the other groups suggested adding a variety of correlated errors and cross-loadings. Most frequent were correlated errors between ac1 and ac2 (in 13 groups), between por1 and por2 (in seven groups), and between pod1 and pod2 (four groups) and a cross-loading of ac3 on POD (five groups). Table S9 in the online supplement presents the modifications introduced in groups and the model fit indexes of the modified models. The last row of Table 3 summarizes the fit indexes for self-enhancement across groups after introducing the modifications. The modified model was acceptable in every group.

Measurement Invariance Across Groups: MGCFA

To test for the measurement invariance of values across 49 groups, we ran an MGCFA for each of the four higher order value models. We included all 49 groups, even those for which the within-group CFA was below the acceptable thresholds (see Tables S5-S8 in the online supplement). This can lead to somewhat poorer fit of the configural models because the poor fit in a single group deteriorates the fit of the simultaneous CFA across many groups. However, it should not affect the evaluation of the metric and scalar models because metric and scalar measurement invariance are evaluated based on the deterioration of the fit caused by equality constraints imposed on loadings or on loadings and intercepts. In the case of self-enhancement, we tested the measurement invariance of the basic model with no modifications. Table 4 summarizes the findings across the 49 groups for each level of invariance (configural, metric, and scalar) for each higher order value.

To assess invariance, we applied the cut-offs of Chen (2007), described above in the methods. As shown in Table 4, for self-transcendence, openness to change, and conservation, both configural and metric measurement invariance were established across all groups. The self-enhancement model failed to support either configural or metric invariance because the model did not meet the threshold for RMSEA. Introducing two error correlations, one in achievement (ac1 with ac2) and one in power resources (por1 with por2), improved the model fit for self-enhancement, making it acceptable at the configural level and nearly so at the metric level (see the last panel of Table 4). As expected with a complex model of 19 values across 49 groups, scalar invariance was not supported for any of the models.

Relative Importance of the 19 Values

The lack of scalar invariance in our data precludes comparing means across groups, so presenting norms would be misleading. Moreover, most groups were represented by convenience samples that could not be matched. Nonetheless, researchers may wish to have a sense of the relative importance of the 19 values and the distribution of means one might expect. To that end, Table 5 presents the 25th, 50th, and 75th percentiles of the means found in the 49 different cultural groups. The relative importance of the values is similar to what Schwartz and Bardi (2001) reported

Table 4. Measurement Invariance of Each Higher Order Value Measured by PVQ-RR Across 49 Groups.

	df	Chi2	CFI	RMSEA [CI]	SRMR
Self-transcendence (UNN UNC UNT BEC BED HUM)					
Configural	5880	22870.1	.953	.051 [.051, .052]	.036
Metric	6456	25685.1	.947	.052 [.052, .053]	.051
Scalar	7032	51908.3	.877	.076 [.076, .077]	.071
Openness to change (SDA SDT ST HE)					
Configural	2352	14136.3	.941	.068 [.067, .069]	.045
Metric	2736	16825.8	.930	.069 [.068, .070]	.068
Scalar	3120	38676.2	.823	.102 [.101, .103]	.101
Conservation (SEP SES COI COR TR FAC)					
Configural	5880	28518.8	.940	.059 [.059, .060]	.046
Metric	6456	32028.6	.933	.060 [.060, .061]	.058
Scalar	7032	58383.5	.865	.082 [.081, .082]	.077
Self-enhancement (AC POD POR)					
Configural	1176	11029.6	.941	.088 [.086, .089]	.053
Metric	1464	14248.5	.923	.089 [.088, .091]	.078
Scalar	1752	34629.9	.803	.131 [.130, .132]	.119
Self-enhancement (AC POD POR; correlated errors for ac1with ac2 and por1with por2 added)					
Configural	1078	7323.3	.963	.073 [.071, .074]	.035
Metric	1366	11092.8	.942	.081 [.079, .082]	.070
Scalar	1654	31687.6	.820	.129 [.128, .130]	.120

Note. PVQ-RR = Portrait Value Questionnaire; *df* = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; UNN = Universalism-Nature; UNC = Universalism-Concern; UNT = Universalism-Tolerance; BEC = Benevolence-Caring; BED = Benevolence-Dependability; HUM = Humility; SDA = Self-Direction-Action; SDT = Self-Direction-Thought; ST = Stimulation; HE = Hedonism; SEP = Security-Personal; SES = Security-Societal; COI = Conformity-Interpersonal; COR = Conformity-Rules; TR = Tradition; FAC = Face; AC = Achievement; POD = Power-Dominance; POR = Power-Resources.

Table 5. Percentiles of the Centered Value Means in 49 Cultural Groups.

Value	25th percentile	50th percentile	75th Percentile
Benevolence-Caring	0.559	0.794	0.887
Benevolence-Dependability	0.546	0.726	0.907
Self-Direction Action	0.469	0.597	0.734
Self-Direction Thought	0.388	0.582	0.696
Universalism-Concern	0.375	0.502	0.669
Universalism-Tolerance	0.178	0.370	0.511
Security-Societal	0.126	0.322	0.440
Security-Personal	0.224	0.281	0.373
Hedonism	0.085	0.228	0.484
Achievement	−0.045	0.078	0.277
Face	−0.114	0.047	0.204
Universalism-Nature	−0.243	−0.105	0.089
Stimulation	−0.292	−0.110	0.005
Conformity-Interpersonal	−0.335	−0.162	0.036
Humility	−0.333	−0.205	−0.096
Conformity-Rules	−0.459	−0.257	−0.119
Tradition	−0.943	−0.719	−0.331
Power-Resources	−1.585	−1.332	−0.991
Power Dominance	−1.560	−1.403	−1.108

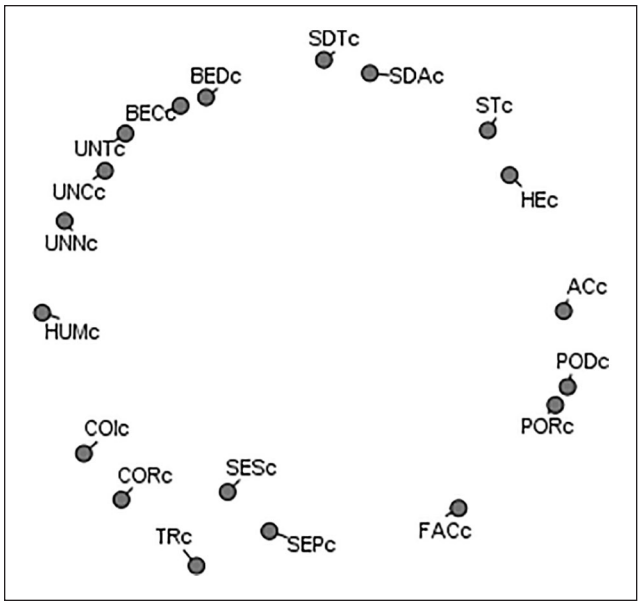

Figure 2. MDS two-dimensional projection of 19 centered values based on pooled correlation matrix of 49 equally weighted cultural groups.
Note. SDT = Self-Direction Thought; SDA = Self-Direction Action; ST = Stimulation; HE = Hedonism; AC = Achievement; POD = Power-Dominance; POR = Power-Resources; FAC = Face; SEP = Security-Personal; SES = Security-Societal; TR = Tradition; COR = Conformity-Rules; COI = Conformity-Interpersonal; HUM = Humility; UNN = Universalism-Nature; UNC = Universalism-Concern; UNT = Universalism-Tolerance; BEC = Benevolence-Caring; BED = Benevolence-Dependability. The c following each label indicates that the value is centered.

with Schwartz Value Survey data that measured only the 10 original values across 62 countries. Here, too, benevolence, self-direction, and universalism values were most important and tradition and power values least important.

Circular Structure of Values: MDS

Figure 2 presents the MDS two-dimensional projection of 19 centered values based on the pooled correlation matrix of 49 equally weighted cultural groups.[5] The order of values around the circle in this overall structure corresponds to the theorized order with no reversals. The openness to change values are on the upper right, the self-enhancement values on the lower right, the conservation values on the lower left, and the self-transcendence values on the upper left. Humility, face, and hedonism are located on the borders between higher order values. Security-societal is a little more toward the center than the other values. We used the coordinates of this projection to represent the theorized value structure as the target for Procrustes rotation of the coordinates of the MDS projection of each of the 49 cultural groups.[6]

On the first dimension, the value structure in all 49 groups exhibited congruence with the overall structure, using the cutoff of > 0.90 for Tucker's phi. On the second dimension, 40 groups exhibited congruence using this cutoff. Only three groups (Ecuador, Ghana, and Philippines) had Tucker's phi coefficients <0.85, indicating clear lack of congruence. The mean Tucker's phi coefficient was 0.964 ($SD = 0.021$) on dimension 1 and 0.930 ($SD = 0.044$) on dimension 2. The first two columns in online supplement Table S11 report the congruence coefficients between the loadings of the value items on the rotated coordinates and their loadings on the coordinates of the overall structure in each group.

The PVQ-RR can also provide scores for the 10 basic values. In forming the narrowly defined values, six basic values (universalism, benevolence, self-direction, power, security, and conformity) were subdivided. To obtain indexes for the 10 basic values, we reunited the subtypes of these six values and combined them with the stimulation, hedonism, achievement, and tradition values. We then computed an MDS 2-dimensional projection of the 10 centered values using the pooled correlation matrix of 49 equally weighted cultural groups to serve as a target structure. This target structure ordered the 10 basic values around the circle as in the theorized circular order.

We then performed MDS analyses of the 10 values in each group and rotated the two dimensional coordinates to the target coordinates. The mean Tucker's phi coefficient was .968 ($SD = .027$) on dimension 1 and .938 ($SD = .059$) on dimension 2 for the 10 values. Forty-eight groups met the congruence criterion (>0.90) on dimension 1 and 38 groups met the criterion on dimension 2. Only Philippines failed to meet the criterion on either dimension. The third and fourth columns in online supplement Table S11 report the Tucker's phi congruence coefficients for each of the 49 groups.

Table 6 summarizes the results of the various tests and assessments.

Discussion

The Schwartz (1992) theory of basic human values has been applied widely across the social sciences. The theory postulated that human values are organized in a circular motivational continuum. The original presentation of the theory identified 10 distinct values in the circle. Researchers have evaluated the various instruments designed to measure the 10 basic values and described their properties (e.g., Cieciuch, Davidov, Algesheimer, et al., 2018; Cieciuch & Schwartz, 2012; Davidov et al., 2008; Schwartz & Boehnke, 2004). Recently, Schwartz (Schwartz, 2017; Schwartz et al., 2012) refined this model of 10 values by specifying 19 more narrowly defined values arrayed on the same circular

Table 6. Summary of the Psychometric Properties of PVQ-RR in All 49 Groups.

Country	Number of HOV with $\alpha > .70$	Number of values with $\alpha > .60$	Dimension 1 MDS Phi Coeff. $> .90$	Dimension 2 MDS Phi Coeff. $> .90$	CFA models acceptable based on CFI $> .900$				
					SelfTran	Openness	Conservat	SelfEnh	SelfEnhM
Australia	All 4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brazil	All 4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Canada English	All 4	13	Yes	Yes	Yes	Yes	Yes	No	Yes
Canada French	All 4	14	Yes	Yes	Yes	Yes	Yes	Yes	Yes
China	All 4	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Colombia	All 4	14	Yes	Yes	Yes	Yes	No	Yes	Yes
Costa Rica	All 4	15	Yes	No	Yes	Yes	Yes	Yes	Yes
Croatia	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Czech Republic	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecuador	All 4	14	Yes	No	Yes	No	Yes	Yes	Yes
Estonia	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Faroe Islands	All 4	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Finland	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
France	All 4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Georgia	All 4	13	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Germany	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ghana	All 4	15	Yes	No	Yes	Yes	Yes	No	Yes
Greece	All 4	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hong Kong	All 4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iceland	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
India	All 4	14	Yes	Yes	Yes	Yes	Yes	No	Yes
Indonesia	All 4	14	Yes	No	Yes	Yes	No	No	Yes
Israel Arab	All 4	15	Yes	No	Yes	Yes	No	No	Yes
Israel Jewish	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Italy	All 4	18	Yes	Yes	Yes	Yes	Yes	No	Yes
Japan	All 4	16	Yes	Yes	Yes	Yes	No	No	Yes
New Zealand	All 4	16	Yes	Yes	Yes	Yes	Yes	No	Yes
Oman	All 4	14	Yes	Yes	Yes	Yes	No	No	Yes
Peru	All 4	17	Yes	Yes	Yes	Yes	No	Yes	Yes
Philippines	All 4	12	Yes	No	Yes	No	Yes	No	Yes
Poland	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Portugal	All 4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Romania	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Russia Caucasus	All 4	16	Yes	Yes	Yes	No	Yes	Yes	Yes
Russia Central	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Russia Siberia	All 4	15	Yes	Yes	No	No	Yes	Yes	Yes
Serbia	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Slovakia	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
South Africa	All 4	17	Yes	Yes	Yes	Yes	Yes	No	Yes
South Korea	All 4	16	Yes	No	Yes	No	Yes	Yes	Yes
Spain	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sweden	All 4	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Switzerland French	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Switzerland German	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Turkey	All 4	14	Yes	No	Yes	Yes	No	Yes	Yes
Ukraine	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
The United Kingdom	All 4	18	Yes	Yes	Yes	Yes	Yes	Yes	Yes
The United States	All 4	17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vietnam	All 4	13	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. PVQ-RR = Portrait Value Questionnaire; HOV = higher order value; CFA = confirmatory factor analysis; CFI = comparative fit index; MDS = multidimensional scaling; SelfTran = Self-transcendence; Openness = Openness to change; Conservat = Conservation; SelfEnh = Self-enhancement; SelfEnhM = Self-enhancement modified.

continuum. He designed a revised questionnaire to measure these values. Many studies using the final version of this questionnaire, the PVQ-RR, have been published or are ongoing (e.g., Chrystal et al., 2019; Hanel et al., 2018; Woltin & Bardi, 2018). The current study presented the basic psychometrics of the PVQ-RR for the first time. This evaluation of the PVQ-RR across 49 cultural groups also contributes to validating the discrimination of 19 values in the refined value theory.

Reliability

The analyses established that the PVQ-RR measured all four higher order values reliably in every cultural group. All Cronbach's internal reliability coefficients were greater than 0.8. The values combined to form two of the higher order values differ somewhat from those used in research with previous value instruments. Face is included in conservation, and humility in self-transcendence.

The PVQ-RR measured 15 of the 19 narrowly defined values reliably in the large majority of groups. Two values, self-direction and achievement, were measured reliably in most groups, but security-personal and humility were problematic. The most problematic value is humility. This value was included in the refined theory to express a motivation between the self-restraint motivation that conservation values express and the motivation to place others' interests ahead of one's own that self-transcendence values express. Humility did, indeed, emerge in the expected location in the MDS projections, filling the gap between the two higher order values. It also correlated almost equally with both the higher order values on which it borders. Perhaps, the dual conceptual associations of the humility construct cannot be captured with a set of highly correlated, similar items. Rather than modifying items in pursuit of internally reliable measurement, it may be necessary to accept the inherent unreliability of any index intended to measure humility. It may nonetheless be used to make valid predictions of attitudes and behaviors (Schwartz et al., 2012, 2017).

For the 10 basic values, the PVQ-RR provides more reliable indexes than any other available value instrument. The mean reliabilities of the four widely used instruments are as follows: PVQ-RR—0.76 across 49 samples; PVQ40—0.64, across 57 samples; SVS—0.61, across 94 samples; and ESS21— 0.57, across 34 countries (see Table S12 in the online supplement). Moreover, the PVQ-RR provides more reliable indexes than any of the other instruments for every one of the 10 values except achievement.

Measurement Models

The best fitting measurement model in the various groups was for self-transcendence values. It established that the six narrowly defined self-transcendence values were well differentiated in virtually every cultural group. The six narrowly defined conservation values and the four openness to change values were well differentiated in the great majority of cultural groups. However, the three narrowly defined self-enhancement values were well differentiated in only about half of the groups. Thus, the meaning of self-enhancement values apparently differs across these cultures. It was possible to attain an acceptable model fit in the remaining groups by introducing various modifications (error correlations or cross-loadings).

Examining the modifications introduced most frequently revealed that, in each instance of correlated errors, all three items loaded significantly on their latent value. However, two items were closer to one another semantically than they were to the third. Thus, ac1 (have ambitions) and a2 (be successful) were closer to one another than to a3 (people recognize what she achieves), por1 (have power money can bring) and por2 (be wealthy) closer than to por3 (own things that show her wealth), and pod1 (people do what she says) and pod3 (be the one who tells others what to do) closer than to pod2 (power to make people do what she wants). In the frequently recurring cross-loading, ac3 had a secondary loading on POD. Perhaps this was because "having people recognize what she achieves" implies that others admire and look up to her, giving her power to influence them.

The groups with the worst fit statistics on the three cutoffs for self-enhancement values were the Philippines, Ghana, and Israel-Arabs. This led us to speculate that the fit of the model for self-enhancement might be affected by the level of societal development. To assess this possibility, we correlated the Human Development Index as an index of development with the CFI and RMSEA statistics as indicators of model fit. The correlations were 0.55 ($p < .001$) with CFI and −0.41 ($p < .01$) with RMSEA. This suggests that people discriminate less among the self-enhancement values (achievement, power dominance, and power resources) in contexts of greater scarcity and existential threat. In such contexts, the importance of pursuing self-interest may be greater, perhaps because it is both more necessary for survival and more acceptable. At the same time, making fine distinctions between types of self-interest may be less critical.

Measurement Invariance

All self-transcendence, openness to change and conservation values were measured invariantly at the configural and metric level. Introducing a pair of correlated errors brought the self-enhancement values close to the metric invariance threshold. This result suggests virtually the same meaning of values across all 49 cultural groups and therefore justifies comparison of value correlates across the groups, although with caution regarding self-enhancement values.

This is the first study of invariance in value measurement across so large a set of cultural groups. To date, all but one study of invariance in value measurement have included European countries and assessed the 10 basic values (Cieciuch, Davidov, Algesheimer, et al., 2018; Davidov et al., 2008). The study that assessed the measurement invariance of the 19 values differentiated in the refined theory used data from the first, experimental version of the questionnaire—PVQ-5x (Cieciuch, Davidov, Vecchione, et al., 2014). It covered eight Westernized countries. For all 19 values, the authors found full configural invariance across all countries and full or partial metric invariance was supported across almost all countries. They also tested for scalar invariance and found full or partial scalar invariance for 10 values across most countries.

The current study included a much larger and more heterogeneous set of cultural groups. Across these 49 cultural groups, scalar invariance was not found. We did not test for partial scalar invariance of the values because we were interested in the general psychometric properties of the PVQ-RR rather than in identifying a subsample of invariant groups at the scalar level. It is entirely possible that scalar invariance is present across subsets of cultural groups for some or all of the values. Researchers who are interested in comparing value means across a subset of countries determined by their research problem, have to test for it on their data and may well find that they can establish scalar or partial scalar invariance. They may also find that they can establish scalar invariance by applying the approximate Bayesian measurement invariance procedure (Cieciuch, Davidov, Schmidt, et al., 2014) or another approach discussed in Davidov et al. (2014) or Cieciuch, Davidov, and Schmidt (2018) that is less strict than the exact approach used here.[7]

Circular Structure of Values

Examination of the spatial organization of the values addressed the following question: How well does the PVQ-RR reproduce the theorized circle of 19 values on average and in each cultural group? The MDS analysis across groups was based on the pooled correlation matrix of 49 equally weighted cultural groups. The analysis revealed that the PVQ-RR perfectly reproduced the order of values around the circle of 19 narrowly defined values in the refined theory. Interestingly, the values were not equally spaced around the circle. Rather, the original values that constitute each higher order value clustered slightly together. The new value, face, filled the large gap between the conservation and self-enhancement values and the new value, humility, filled the large gap between self-transcendence and conservation. The other two gaps were small.

Although most values were located on the circumference of the circle, tradition emerged slightly more toward the outside and security-social slightly more toward the center. The location of tradition toward the outside replicated its most common position in studies with the SVS (Schwartz, 1992). To understand why societal-security values emerged toward the center of the circle, we examined its correlations with the other values. This revealed more positive correlations with universalism values than expected based on its theorized location. In turn, this implied some shared motivation with universalism values. Concern for societal-security, like universalism, expresses an interest in the well-being of the wider society.

The coordinates of the MDS analyses in each group were rotated to assess the degree of congruence between the structure in each group and the overall circular value structure. The congruence of the individual group structures was high for all groups on dimension 1 and for 82% of the groups on dimension 2. The slightly lower congruence on the second dimension may result from problems with the measurement model for self-enhancement values in some groups.

Dimension 1 captures the social (left) versus personal (right) motivational opposition organizing values; dimension 2 largely captures the growth (top) versus protection (bottom) values opposition (cf. Figure 2).

For researchers who may wish to use the PVQ-RR to study the 10 basic values, we also assessed its ability to reproduce the circle with 10 values in each group. The congruence of the individual group structures with the overall structure was high for all but the Philippines on dimension 1 and for 78% of the groups on dimension 2. Fischer (2013) ran similar analyses of congruence between the value structure in each of 53 samples of teachers who responded to the SVS and their overall structure. The average level of congruence across the two dimensions for the SVS samples was .525. This compares with the average level of .953 for the PVQ-RR here. Clearly, the PVQ-RR is superior for reproducing the circular structure of 10 values.

Previous research with the SVS (Fontaine et al., 2008) and the PVQ in the European Social Survey (Bilsky et al., 2011) reported that both sample size and societal development related positively to the congruence between the structure of 10 values in various samples and the prototypical structure. In particular, the more developed the society the more clearly the growth values were distinguished from the protection values. Dimension 2 represented the growth versus protection opposition in our data. Sample size had no effect on congruence for either dimension in our study. However, societal development significantly affected congruence on dimension 2. The Human Development Index of the cultural groups correlated 0.48 ($p < .001$) with Tucker's phi on this growth versus protection dimension. This lends further support to the argument that societal development provides people with more autonomy to choose goals that allow individual growth and expression.

Conclusion

The current study established that the 32 language versions of PVQ-RR are a sound measure for all higher order and almost all more narrowly defined values across 49 cultural groups. Future research can confidently apply the PVQ-RR to study correlations of values with other variables and to compare correlations across cultural groups. Because value effects entail a process of trade-offs among the relevant neighboring and opposing values, it is worthwhile to include multiple, potentially relevant opposing values when examining relations of values with other variables. This may minimize some problems we identified with a few single, narrowly defined values. Across subsets of cultures, many of the values may also be scalar invariant, thereby permitting comparison of value importance scores. Future work should address that possibility. This study also established that the PVQ-RR reproduces the circular order of the 19 values in almost all the cultural groups. The combination of cross-cultural evidence for the discrimination of the 19 values and their circular order provides substantial validation for the refined theory of values.

Acknowledgments

The work of JC was supported by the University Research Priority Program Social Networks of the University of Zurich.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. We are grateful to the following individuals who provided data included in this study: Maher Abu Hilal, Pilar Aguilar, Muna Al-Bahran, Denis Bratko, Laura Andrade, Ilya Askama, Leonardo Blanco, Constanze Beierlein, Magdalena Bobowik, Diana Boer, Rebecca Brightly, Kate Bushina, Pablo Sanchez Campos, Xioamara Paola Carrera, Jeong Won Choi, August Corrons, Davur i Dali, Myra Damayanti, Vincent Dru, Uwana Evers, Ronald Fischer, Ivonne Florez, Pia Furchheim, Ragna B. Garðarsdóttir, Aikaterini Gari, Joy Carmel Gorospe, Sylvie Graf, Katy Greenland, Judy Guo, Peter Halama, Jamin Halberstadt, Magdalena S. Halim, Renata Heilman, Martina Hřebíčková, Harry Hui, Li JiaJun, Brendan Johnson, Christian Kandler, Ruth Kansky, Johannes Karl, Goran Knežević, Michal Kohút, Martin Kolnes, Andreas Krafft, Mika Lassander, Ljiljana Lazare, Nadezda Lebedeva, Julie Lee, Young Ho Lee, Kevin LeGrand, Ana Makashvili, Rasmus Mannerström, Andrew Marty, Iris Marušić, Milica Marusic, Jamie McQuilken, Vinka Mlakic, Zubin Mulla, Sophia Murphy, Joonha Park, Alexandre Pascaul, Vassilis Pavlopoulos, Christos Pezirkianidis, Tracey Platt, René Proyer, Olivera Radovic, Ano Realo, Jean-Pierre Rollan, Oliver Rowe, Willibald Ruch, Desireé Ruiz, Florencia Sortheix, Nicolas Souchon, Alexander Stahlman, Ana Strojano, Oleg Sychev, Maya Tamir, Eugene Tartakovsky, Saumya Tiwari, Claudio Torres, Paul Trapnell, Angela Trujillo, Thi Khanh Ha Truong, Akira Utsugi, Michele Vecchione, Raul Velazquez, Sophie Walsh, Yumei Wang, Georgi P. Yankov, Michelle Yik, Emilia Yun Ding, and Ekaterina Zabelina.
2. The scripts for the MDS, CFA, and MGCFA analyses are available at the Open Science Framework (https://osf.io/w9as3/?view_only=e1f02bf232c34d39b9884398b4f2df63).
3. If the program did not run, we used coordinates placing the 19 values at equal distances around the circle as the initial configuration (Bilsky & Janik, 2010). The MDS analyses were done on mean-centered values. All other analyses in this paper were done on raw (uncentered) values. See the "scoring and instructions for analyses with the PVQ-RR" at the OSF site.
4. As reported and shown in Figure 2, this overall structure closely represented the theorized structure.
5. Table S10 in the online supplement presents the correlation matrix on which we ran the MDS analysis.
6. The theory postulates the order of values around the circle but makes no assumption about the distances between values. The idea of higher order values implies that values within each higher order value are somewhat closer together. We therefore preferred the average projection, which captured this arraying of values, to serve as the target rather than a structure that arbitrarily places all 19 values at equal distances. The coordinates of the target value structure and the 49 two-dimensional MDS projections are available in the Open Science Framework, at https://osf.io/w9as3/?view_only=e1f02bf232c34d39b9884398b4f2df63.
7. Cieciuch, Davidov, Schmidt, et al. (2014) provide an example of the Mplus syntax for the approximate measurement invariance test with explanations for a single factor.

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